

Remarks

In the outstanding Office Action, the Examiner has rejected claims 1-54 under 35 U.S.C. §103(a) as being unpatentable over Reese et al., United States Patent No. 5,656,791, (hereinafter "Reese") in view of Mravic et al., United States Patent No. 6,158,351, (hereinafter "Mravic") in view of the Goetzel article (hereinafter "Goetzel").

Claims 1-54 were originally presented for Examination. Claims 26-28 and 42-44 have been cancelled by way of the present response. Claims 55-60 have been added by way of the present response. Claims 1-25, 29-41 and 45-60 are currently pending, of which, claims 1, 9, 23, 29, 35, 39, 45, 51, 55 and 58 are in independent form. Favorable reconsideration of the present Response as currently constituted is respectfully requested.

Rejections Under 35 U.S.C. §103(a)

Claims 1-54 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Reese, in view of Mravic, in view of Goetzel.

Claim 1

1. A liner for a shaped charge comprising:
a mixture of powdered heavy metal and powdered metal binder wherein said powdered heavy metal comprises from 92 percent by weight of said mixture to 97 percent by weight of said mixture, and wherein said powdered metal binder comprises from 8 percent by weight of said mixture to 3 percent by

weight of said mixture, said mixture compressively formed into a liner body shape.

The applicant has amended claims 1 to recited a liner formed from a mixture of between 92 and 97 percent by weight of the powdered heavy metal and between 8 and 3 percent by weight of the powdered metal binder. The Examiner has acknowledged that Mravic teaches an upper limit of about 90% heavy metal (tungsten).

Likewise, Reese teaches an upper limit of about 90% heavy metal (tungsten). Specifically, Reese teaches combining a powdered tungsten with a powdered metal binder in particular ranges to form a shaped charge liner. Reese states that:

A range of compositions of powdered metal mixture, including powdered tungsten up to about 90 percent by weight and powdered metal binder of 10 percent by weight, down to powdered tungsten of about 70 percent by weight and powdered metal binder to 30 percent by weight has been tested. It has been determined through this testing that mixture compositions within the specified range still provide effective shaped charge performance.

Typically, the powdered metal binder comprises powdered lead. Alternatively, . . . the powdered metal binder can comprise bismuth. While lead and bismuth are more typically used for the powdered metal binder, other metals having high ductility and malleability can be used for the powdered metal binder. Other metals which have high ductility and malleability comprise tin, uranium, silver, gold, antimony, zinc, cobalt and nickel.

The present invention also provides for compositions for the liner 5 to include powdered copper intermixed with the powdered binder metal and powdered tungsten. (Column 3, Line 55 - Column 4, Line 7).

Goetzel only teaches that oil can be used as a lubricant in powdered metal mixtures.

None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses a powdered heavy metal such as tungsten in a mixture with a powdered metal binder wherein the weight percent of the powdered heavy metal is between 92 and 97 percent and the weight percent of the powdered metal binder is between 8 and 3 for use in a liner for a shaped charge as presently claimed in claim 1. As such, claim 1 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 1.

Claims 2-8

Claims 2-8 depend from claim 1 and add further limitations. Accordingly, each of claims 2-8 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 2-8.

Claim 9

9. A shaped charge comprising:
a housing;
a quantity of explosive inserted into said housing; and
a liner inserted into said housing so that said quantity of explosive is positioned between said liner and said housing, said liner formed from a mixture of powdered heavy metal and powdered metal binder, wherein said powdered heavy metal comprises from 92 percent by weight of said mixture to 97 percent by weight of said mixture, and wherein said powdered metal binder comprises from 8 percent by weight of

said mixture to 3 percent by weight of said mixture, said mixture compressively formed into a liner body shape.

The applicant has amended claims 9 to recited a shaped charge having a liner formed from a mixture of between 92 and 97 percent by weight of the powdered heavy metal and between 8 and 3 percent by weight of the powdered metal binder. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses a powdered heavy metal such as tungsten in a mixture with a powdered metal binder wherein the weight percent of the powdered heavy metal is between 92 and 97 percent and the weight percent of the powdered metal binder is between 8 and 3 for use in a liner for a shaped charge as presently claimed in claim 9. As such, claim 9 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 9.

Claims 10-22

Claims 10-22 depend from claim 9 and add further limitations. Accordingly, each of claims 10-22 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 10-22.

Claim 23

23. A liner for a shaped charge comprising:
a mixture of powdered tungsten and powdered metal binder including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder including lead and a metal selected from the group comprising tantalum, molybdenum and combinations thereof, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 23 to recited a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder including lead and a metal selected from the group comprising tantalum, molybdenum and combinations thereof. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 23. As such, claim 23 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 23.

Claims 24-25

Claims 24-25 depend from claim 23 and add further limitations. Accordingly, each of claims 24-25 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant

respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 24-25.

Claim 29

29. A liner for a shaped charge comprising:
a mixture of powdered tungsten and powdered metal binder including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder comprising lead and tantalum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 29 to recited a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder comprising lead and tantalum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder comprising lead and tantalum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 29. As such, claim 29 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 29.

Claims 30-34

Claims 30-34 depend from claim 29 and add further limitations. Accordingly, each of claims 30-34 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 30-34.

Claim 35

35. A liner for a shaped charge comprising:
a mixture of powdered tungsten and powdered metal binder including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder comprising lead and molybdenum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 35 to recited a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder comprising lead and molybdenum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder comprising lead and molybdenum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 35. As such, claim 35 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant

respectfully requests withdrawal of the §103(a) rejection and allowance of claim 35.

Claims 36-38

Claims 36-38 depend from claim 35 and add further limitations. Accordingly, each of claims 36-38 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 36-38.

Claim 39

39. A shaped charge comprising:
a housing;
a quantity of high explosive inserted into said housing;
and
a liner inserted into said housing so that said high explosive is positioned between said liner and said housing, said liner compressively formed from a mixture of powdered tungsten and powdered metal binder, the mixture including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder including lead and a metal selected from the group comprising tantalum, molybdenum and combinations thereof, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 39 to recited a shaped charge having a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder including lead and a metal selected from the group comprising tantalum, molybdenum and combinations thereof. None of the art cited by the Examiner either alone or in

combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 39. As such, claim 39 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 39.

Claims 40-41

Claims 40-41 depend from claim 39 and add further limitations. Accordingly, each of claims 40-41 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 40-41.

Claim 45

45. A shaped charge comprising:
a housing;
a quantity of high explosive inserted into said housing;
and
a liner inserted into said housing so that said high explosive is positioned between said liner and said housing, said liner compressively formed from a mixture of powdered tungsten and powdered metal binder, the mixture including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder comprising lead and tantalum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 45 to recited a shaped charge having a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder comprising lead and tantalum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder comprising lead and tantalum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 45. As such, claim 45 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 45.

Claims 46-50

Claims 46-50 depend from claim 45 and add further limitations. Accordingly, each of claims 46-50 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 46-50.

Claim 51

51. A shaped charge comprising:
a housing;

a quantity of high explosive inserted into said housing;
and

a liner inserted into said housing so that said high explosive is positioned between said liner and said housing, said liner compressively formed from a mixture of powdered tungsten and powdered metal binder including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the binder, the binder comprising lead and molybdenum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has amended claims 51 to recited a shaped charge having a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of the powdered metal binder comprising lead and molybdenum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with a powdered metal binder comprising lead and molybdenum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered metal binder is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 51. As such, claim 51 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests withdrawal of the §103(a) rejection and allowance of claim 51.

Claims 52-54

Claims 52-54 depend from claim 51 and add further limitations. Accordingly, each of claims 52-54 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant

respectfully requests withdrawal of the outstanding \$103(a) rejections and allowance of claims 52-54.

Claim 55

55. A liner for a shaped charge comprising:
a mixture of powdered tungsten and powdered tantalum including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the tantalum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has added new claim 55 to recited a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of tantalum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with powdered tantalum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered tantalum is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 55. As such, claim 55 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests allowance of claim 55.

Claims 56-57

Claims 56-57 depend from claim 55 and add further limitations. Accordingly, each of claims 56-57 is allowable as being dependent

on an allowable independent claim. Accordingly, Applicant respectfully requests withdrawal of the outstanding §103(a) rejections and allowance of claims 56-57.

Claim 58

58. A shaped charge comprising:
a housing;
a quantity of high explosive inserted into said housing;
and
a liner inserted into said housing so that said high explosive is positioned between said liner and said housing, said liner compressively formed from a mixture of powdered tungsten and powdered tantalum, the mixture including approximately 92 to 99 percent by weight of the tungsten and approximately 8 to 1 percent by weight of the tantalum, the mixture compressively formed into a substantially conically shaped rigid body.

The applicant has added new claim 58 to recited a shaped charge having a liner formed from a mixture of between 92 and 99 percent by weight of tungsten and between 8 and 1 percent by weight of tantalum. None of the art cited by the Examiner either alone or in combination teaches, suggests or discloses powdered tungsten in a mixture with powdered tantalum wherein the weight percent of the powdered tungsten is between 92 and 99 percent and the weight percent of the powdered tantalum is between 8 and 1 for use in a liner for a shaped charge as presently claimed in claim 58. As such, claim 58 is not rendered obvious by any of the cited art either alone or in combination. Accordingly, Applicant respectfully requests allowance of claim 58.

Claims 59-60

Claims 59-60 depend from claim 58 and add further limitations. Accordingly, each of claims 59-60 is allowable as being dependent on an allowable independent claim. Accordingly, Applicant respectfully requests allowance of claims 59-60.

Fee Statement

Compared to the initial filing, in the present Response, the number of independent claims has increased by two and the total number of claims has remained the same. Applicant is requesting a three-month extension of time to file this response. Accordingly, Applicant has enclosed herewith a Form PTO-2038 authorizing payment in the amount of \$1,420.00 for a three-month extension of time and the extra independent claim fee. Applicant believes no additional fees are due for the filing of this Response. If any additional fees are due or overpayment have been made, please charge or credit, our Deposit Account No. 03-1130.

Conclusion

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the outstanding objections and rejections and allow claims 1-25, 29-41 and 45-60 presented for reconsideration herein. Accordingly, a favorable action in the form of an early notice of allowance is respectfully requested.

The Examiner is requested to call the undersigned for any reason that would advance the instant application to issue.

Dated this 26th day of January, 2005.

Respectfully submitted:



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